PATENT ABSTRACTS OF JAPAN

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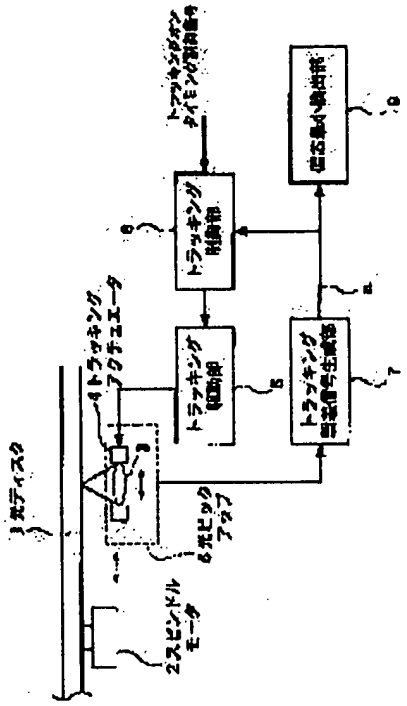
(54) OPTICAL DISK RECORDING AND REPRODUCING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an optical disk recording and reproducing device in which the accuracy and the stablity of a tracking control in an accentric disk are both enhanced.

SOLUTION: This optical disk recording and reproducing device has a tracking actuator 4 performing the tracking operation of an optical disk 1 and a tracking control part 8 turning tracking ON by driving the actuator 4 based on the tracking error signal (a) detected from the disk 1. In this case, the device is provided with an eccentric munimum detecting part 9 as a control means which controls the tracking control part 8 so as to turn the tracking ON while positioning the central position of the movable range of the actuator 4 at the center or the roughly central position of an accentric range due to the revolution of the disk 1.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The center or the optical disk record regenerative apparatus which positioned to the mid gear mostly and established said control means controlled to carry out tracking-on of the eccentric range according [on the optical disk record regenerative apparatus which has the tracking actuator which performs tracking actuation of an optical disk, and the tracking control section which drives said tracking actuator based on the tracking error signal detected from said optical disk, and carries out tracking-on, and] the mid gear of the movable range of said tracking actuator to disk rotation.
[Claim 2] The optical disk record regenerative apparatus which established the control means controlled to measure the period of the tracking error signal produced with the eccentric error by disk rotation in the optical disk record regenerative apparatus which has the tracking actuator which performs tracking actuation of an optical disk, and the tracking control section which controls said tracking actuator, to detect the change timing near the minimum value of this measured period, and to close the loop formation of a tracking control system to said detection timing.
[Claim 3] The truck cross generation circuit which generates the crossing signal of a truck to the truck error signal which has the periodicity which synchronized the control means with rotation of the motor made to rotate an optical disk, A measurement means to measure the period of the crossing signal of said truck, and a detection means to detect near the minimum value of said period, The optical disk record regenerative apparatus according to claim 2 constituted from a tracking timing generation circuit it is directed to a tracking control section that carries out tracking-on to the timing near the minimum value of said period.
[Claim 4] A generation means to generate the rotation synchronizing signal which synchronized with rotation of the motor made to rotate an optical disk is established. The period of the tracking error signal which produces a control means with the eccentric error by disk rotation is measured. Detect correlation with the measurement location of the maximum of said period, and the minimum value, and the generating location of said rotation synchronizing signal, and it memorizes in memory. The optical disk record regenerative apparatus according to claim 2 constituted so that the loop formation of a tracking control system might be closed to the timing near the minimum value of said period based on the number of counts from the metrics point of said rotation synchronizing signal.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the optical disk record regenerative apparatus which made more effective tracking control possible especially about the optical disk record regenerative apparatus equipped with at least one side of the function which records information on an optical disk, and the function which reproduces the information recorded on the optical disk.
[0002]
[Description of the Prior Art] The tracking control of the conventional optical disk record regenerative apparatus is explained using drawing 7 . As this optical disk record regenerative apparatus is shown in drawing 7 , an optical disk 1, The spindle motor 2 made to rotate an optical disk 1 and the optical pickup 5 which has the movable tracking actuator 4 for an objective lens 3 in radial [of an optical disk 1], and records / reproduces the signal of this optical disk 1, The tracking mechanical component 6 which drives the tracking actuator 4, The tracking error signal generation section 7 which generates the tracking error signal a from a phot detector signals of an optical pickup 5, Based on the tracking error signal a, it consists of tracking control sections 8 which determine the gain for continuing carrying out on-tracking on a disk, frequency characteristics, and a phase characteristic.
[0003] Here, the tracking control action of this optical disk record regenerative apparatus is explained below. Where an optical disk 1 is rotated for the laser beam controlled by focal control which condenses the laser beam for the /record for playback on an optical disk 1 with a spindle motor 2, an optical disk 1 is irradiated. The tracking error signal generation section 7 generates the tracking error signal a from a phot detector signals of an optical pickup 5. The tracking control section 8 controls the tracking mechanical component 6 to supply a signal with the gain, frequency characteristics, and the phase characteristic for continuing carrying out an on-truck to the tracking actuator 4 of an optical pickup 5 on an optical disk 1, and to carry out tracking-on based on the tracking error signal a.
[0004]
[Problem(s) to be Solved by the Invention] In such an optical disk record regenerative apparatus, the optical spot by which focal control was carried out will usually perform much traces over the truck of a book by pin center,large gap of the optical disk itself, the pin center,large gap when carrying out chucking of the optical disk on a drive motor, axial gap of motor confidence, etc., without tracing the same truck top.
[0005] The tracking error signal a of this condition is shown in drawing 8 (a). As shown in drawing 8 (b), when a center line is used as the optical spot on the same truck, an optical spot will trace the location on the disk up and down shifted to the center line. Drawing 8 (a) and (b) are mutually related. In carrying out an on-truck to the truck of the shape of a spiral of the optical disk 1 which rotates with a spindle motor 2 in the condition that there is the above-mentioned eccentricity, there is a problem that it is not known to what timing of drawing 8 (b) an on-truck is carried out. That is, the location on the disk when it being random, and an on-truck being carried out, and carrying out an on-truck will turn into a location of the arbitration on the disk trace locus shown in drawing 8 (b). Since it is a non-control state

when the drive signal of the tracking actuator 4 just before carrying out an on-truck has a level disk, the actuation when maintaining tracking-on of the next tracking actuator 4 and going with the location of the disk of said on-truck, differs greatly.

[0006] For example, supposing tracking control is turned on with the mid gear of the eccentric range of an optical disk 1 As shown in drawing 9 (a), the period of the tracking error signal a carries out an on-truck in a short part. By positioning the mid gear of the movable range of the tracking actuator 4 as a criteria location, as shown in drawing 9 (b), and carrying out movable [of this tracking actuator 4] according to the amount of eccentricity of a truck The eccentricity of an optical disk 1 will be followed and an on-truck condition will be maintained. In this case, it can be said that it is in a good tracking condition since the tracking actuator 4 carries out movable [only of said amount of eccentricity] a core [the mid gear of that movable range].

[0007] However, supposing tracking control is turned on in the maximum serious grade location of an optical disk 1 As shown in drawing 10 (a), the period of the tracking error signal a carries out an on-truck in a long part. The location which is distant from a mid gear among the movable range of the tracking actuator 4 as shown in drawing 10 (b) is positioned as a criteria location. By carrying out movable [of this tracking actuator 4] according to the amount of eccentricity of a truck a core [this location], the eccentricity of an optical disk 1 will be followed and an on-truck condition will be maintained. In this case, since the tracking actuator 4 will carry out movable [only of said amount of eccentricity] a core [the location distant from the mid gear of that movable range], on the point A shown in drawing 10 (b), the amount of displacement of the tracking actuator 4 is large, it will be in an unstable tracking condition, and there is a problem that the precision of a tracking error signal gets worse. moreover, the min of an optical disk 1 -- a variation rate -- the case where tracking control is turned on in a location -- the same -- the variation rate of the tracking actuator 4 -- it can imagine that an amount becomes large and there is a problem that the precision of a tracking error signal gets worse.

[0008] Then, it is very difficult optically, mechanically, and in assembly precision to make the aforementioned movable range large to extent which obtains the stable tracking engine performance, although it is possible to enlarge the movable range of the tracking actuator 4, and to obtain the stable tracking engine performance. Moreover, there is a problem that the precision of a tracking error signal gets worse as it separates from the center of the aforementioned movable range.

[0009] This invention aims at offering the optical disk record regenerative apparatus which raised the precision and constancy of tracking control in an eccentric disk.

[0010]

[Means for Solving the Problem] the center of the eccentric range according [the optical disk record regenerative apparatus of this invention] the mid gear of the movable range of a tracking actuator to disk rotation -- or it positions to a mid gear mostly and said control means controlled to carry out tracking-on is established. According to this invention, the amount of displacement by the eccentricity of a tracking actuator can become near min, the movable range of a tracking actuator can be made to the stable tracking control range, and the precision and stability of tracking control in an eccentric disk can be raised.

[0011]

[Embodiment of the Invention] The tracking actuator with which invention of this invention according to claim 1 performs tracking actuation of an optical disk, In the optical disk record regenerative apparatus which drives said tracking actuator based on the tracking error signal detected from said optical disk, and has the tracking control section which carries out tracking-on The mid gear of the movable range of said tracking actuator is used as the center or the optical disk record regenerative apparatus which positioned to the mid gear mostly and established said control means controlled to carry out tracking-on of the eccentric range by disk rotation. Tracking control can always be turned on with the mid gear of the eccentricity of a disk in stability, stable tracking control can be performed in the condition with little movable range of an actuator, and the precision and stability of tracking control in an eccentric disk can be raised.

[0012] In the optical disk record regenerative apparatus which has the tracking actuator with which

invention of this invention according to claim 2 performs tracking actuation of an optical disk, and the tracking control section which controls said tracking actuator The period of the tracking error signal produced with the eccentric error by disk rotation is measured. Detect the change timing near the minimum value of this measured period, and it considers as the optical disk record regenerative apparatus which established the control means controlled to close the loop formation of a tracking control system to said detection timing. Tracking control can always be turned on with the mid gear of the eccentricity of a disk in stability, stable tracking control can be performed in the condition with little movable range of an actuator, and the precision and stability of tracking control in an eccentric disk can be raised.

[0013] The truck cross generation circuit which generates the crossing signal of a truck to the truck error signal which has the periodicity to which invention of this invention according to claim 3 synchronized the control means with rotation of the motor made to rotate an optical disk, A measurement means to measure the period of the crossing signal of said truck, and a detection means to detect near the minimum value of said period, It considers as the optical disk record regenerative apparatus according to claim 2 constituted from a tracking timing generation circuit it is directed to a tracking control section that carries out tracking-on to the timing near the minimum value of said period. The control means to which it carries out possible [of the stable tracking control] is concretely realizable.

[0014] Invention of this invention according to claim 4 establishes a generation means to generate the rotation synchronizing signal which synchronized with rotation of the motor made to rotate an optical disk. The period of the tracking error signal which produces a control means with the eccentric error by disk rotation is measured. Detect correlation with the measurement location of the maximum of said period, and the minimum value, and the generating location of said rotation synchronizing signal, and it memorizes in memory. It considers as the optical disk record regenerative apparatus according to claim 2 constituted so that the loop formation of a tracking control system might be closed to the timing near the minimum value of said period based on the number of counts from the metrics point of said rotation synchronizing signal. Even if the amount of said displacement according to the eccentricity of a tracking actuator similarly becomes near min and it is based on the number of counts from the metrics point of said rotation synchronizing signal Tracking control can be turned on with the mid gear of the eccentricity of a disk. The movable range of an actuator in few condition In not removing stable tracking control completed and especially equipped with the same disk The tracking-on control after a two-times eye is based on counted value [finishing / storage]. A generation output can be performed and stable tracking control can do a tracking-on timing signal. It can prevent detecting correlation with the measurement location of the maximum of the period of the above-mentioned tracking error signal, and the minimum value, and the generating location of said rotation synchronizing signal, and carrying out duplication activation of the processing of memorizing in memory.

[0015] Hereafter, the optical disk record regenerative apparatus of this invention is explained based on the gestalt of concrete operation.

(Gestalt 1 of operation) The optical disk record regenerative apparatus of the gestalt 1 of operation of this invention shown in drawing 1 The tracking actuator 4 which performs tracking actuation of an optical disk 1 like the above-mentioned conventional example, It is the optical disk record regenerative apparatus which drives the tracking actuator 4 based on the tracking error signal a detected from the optical disk 1, and has the tracking control section 8 which carries out tracking-on. The center or the point of having positioned to the mid gear mostly and having formed the eccentric minimum detecting element 9 as said control means controlled to carry out tracking-on of the eccentric range according the mid gear of the movable range of the tracking actuator 4 to disk rotation differs from the above-mentioned conventional example.

[0016] The truck cross generation circuit 10 which generates the crossing signal of a truck to the tracking error signal a which has the periodicity to which this eccentric minimum detecting element 9 synchronized with rotation of the spindle motor 2 made to rotate an optical disk 1 as shown in drawing 2 , The truck cross period measurement circuit 11 as a measurement means to measure the period of the crossing signal of said truck, It consists of a measurement period minimum value judging circuit 15 as a

detection means to detect near the minimum value of said period, and a tracking timing generation circuit 17 it is directed to a tracking control section that carry out tracking-on to the timing near the minimum value of said period.

[0017] Here, actuation of this optical disk record regenerative apparatus is explained below. In order to make into a certain linear velocity the optical spot of the optical disk 1 which carries out record playback of the light which condenses the laser beam for the /record for playback on an optical disk 1, and by which focal control was carried out, this optical disk 1 is rotated with a spindle motor 2. In the state of this rotation, the light which condenses a laser beam and by which focal control was carried out is irradiated at an optical disk 1. The optical spot of an optical disk 1 is condensed to the phot detector of an optical pickup 5, and light is received.

[0018] The tracking error signal generation section 7 generates the tracking error signal a based on a phot detector signals from an optical pickup 5, and outputs it to the tracking control section 8 and the eccentric minimum detecting element 9. This tracking error signal a is a wave as shown in drawing 3 (a) by disk eccentricity. Here, it explains using the eccentric detection processing flow chart which shows actuation of this eccentric minimum detecting element 9 to drawing 4 .

[0019] The truck cross signal generation circuit 10 generates a truck cross signal as carried out a party rate etc. with a certain threshold and shown in drawing 3 (b) based on the tracking error signal a. This truck cross signal is the same as that of the period of the tracking error signal a, and it is made into the binary digital signal expressed in "1" as "0" so that it may be easy to perform digital processing.

[0020] The truck cross period measurement circuit 11 measures the period of the truck cross signal generated in the truck cross signal generation circuit 10 using a counter. Specifically, it measures using a counter etc. what pulse measurement of the pulse from a reference frequency generator can be carried out between said edges etc. using the sufficiently high standard-of-frequency frequency generator of extent which can measure the period of a truck cross signal using the rising edge of this truck cross signal, or a falling edge. This is equivalent to step S1 shown in drawing 4 . The period of a truck cross signal is measured as shown in drawing 3 (c). In addition, the same time scale is illustrating drawing 3 (a) - (d).

[0021] It judges whether the judgment circuit 12 has the period larger than the set point set up from the exterior measured in the truck cross period measurement circuit 11 beyond the measurement period set point. This is equivalent to step S2 shown in drawing 4 . If it detects that the period which the above measured is beyond a setup at this step S2, it will ask for the radix point P1 which does not branch to step S3 but is shown in drawing 3 (c).

[0022] The measurement period maximum judging circuit 13 judges whether the period measured in the truck cross period measurement circuit 11 is maximum. This is equivalent to step S3 shown in drawing 4 . When undetectable in the period which the above measured at said step S2 being beyond a setup, at this step S3, the maximum of the period which the above measured is calculated and it asks for said radix point P1 shown in drawing 3 (c) similarly.

[0023] The measurement period direction detector 14 detects whether it is going in the truck cross period measurement circuit 11 in the direction where the period under measurement is large, or the small direction. This is equivalent to step S4 shown in drawing 4 . The period which the above after a radix point P1 measured is short, namely, it detects whether the frequency is high. The measurement value is memorized with storage etc. n times, and, specifically, it judges by whether the period is decreasing with time amount progress n times.

[0024] The measurement period minimum value judging circuit 15 judges whether the period measured in the truck cross period measurement circuit 11 is the minimum value. This is equivalent to step S5 shown in drawing 4 . It judges whether the minimum value of the period which the above after a radix point P1 measured came. Although the minimum value of this period is a place whose frequency is maximum, the point with which a frequency began to fall is having passed the minimum value of the aforementioned period and there is some time amount progress, as shown in drawing 3 (c), this point P2 is made into the periodic minimum value.

[0025] The measurement time management circuit 16 measures the time amount after the measurement /

judgment / detector in the judgment circuit 12, the measurement period maximum judging circuit 13, the measurement period direction detector 14, and the measurement period minimum value judging circuit 15 carry out initiation of operation beyond the measurement period set point, and is managed. The tracking-on timing generation circuit 17 outputs a tracking-on timing signal to the tracking control section 8 to the timing of the point P2 shown in drawing 3 (c). This is equivalent to step S6 shown in drawing 4 .

[0026] As the tracking actuator 4 is positioned and the tracking control section 8 carries out tracking-on to the timing of the point P2 shown in drawing 3 (c), it carries out a signal output at the TORAKINGU mechanical component 6. Based on the signal from the tracking control section 8, the tracking mechanical component 6 supplies a signal with the gain for continuing carrying out on-tracking to the tracking actuator 4 of an optical pickup 5 on a disk, frequency characteristics, and a phase characteristic, and carries out tracking-on. Thus, the loop formation of a tracking control system is closed.

[0027] Thus, since tracking-on is carried out to the timing of the point P2 shown in drawing 3 (c) Tracking control will be turned on with the mid gear of the eccentric range of an optical disk 1. As shown in drawing 9 (a), the period of the tracking error signal a carries out an on-truck in a short part. As shown in drawing 9 (b), the mid gear of the movable range of the tracking actuator 4 is positioned as a criteria location. According to the amount of eccentricity of a truck, movable [of this tracking actuator 4] will be carried out, the eccentricity of an optical disk 1 will be followed, and an on-truck condition will be maintained. Therefore, it can be said that it is in a good tracking condition since the tracking actuator 4 carries out movable [only of said amount of eccentricity] a core [the mid gear of the movable range].

[0028] Thus, since it constituted, tracking control can always be turned on with the mid gear of the eccentricity of a disk in stability, stable tracking control can be performed in the condition with little movable range of an actuator, and the precision and stability of tracking control in an eccentric disk can be raised.

(Gestalt 2 of operation) The optical disk record regenerative apparatus of the gestalt 2 of this operation shown in drawing 5 A generation means 18 to generate the rotation synchronizing signal b which synchronized with rotation of the spindle motor 2 as a motor which makes the optical disk record regenerative apparatus of the gestalt 1 of the above-mentioned operation rotate an optical disk 1 is established. The eccentric minimum detecting element 19 as a control means is added to the function of the eccentric minimum detecting element 9 of the gestalt 1 of the above-mentioned operation. Detect correlation with the measurement location of the maximum of the period of the tracking error signal produced with the eccentric error by disk rotation, and the minimum value, and the generating location of the rotation synchronizing signal b, and it memorizes in memory. The points constituted so that the loop formation of a tracking control system might be closed to the timing near the minimum value of said period based on the number of counts from the radix point P1 as a metrics point of the rotation synchronizing signal b differ in the gestalt 1 of the above-mentioned operation.

[0029] This generation means 18 consists of spindle rotation synchronizing signal generation section 18b which generates the rotation synchronizing signal b as shown in drawing 6 (e) which synchronized with rotation of the spindle motor 2 generated in FG (Frequency Generator) sensor 18a which takes out the rotation signal of a spindle motor 2, and this FG sensor 18a. Here, actuation of this optical disk record regenerative apparatus is explained below.

[0030] In addition, since the truck cross signal shown in the tracking error signal a shown in drawing 6 (a) and drawing 6 (b) like the gestalt 1 of the above-mentioned operation and the periodic data shown in drawing 6 (c) are generated, the concrete explanation is omitted here. The radix point P1 from the judgment beyond the maximum of the period of the truck cross signal shown in drawing 6 (b) or the set point is detected like the gestalt 1 of the above-mentioned operation, and the point P2 near the minimum value of this period is detected.

[0031] The location of the rotation synchronizing signal b generated by spindle rotation synchronizing signal generation section 18b when detecting this point P2 is memorized. Correlation with counted value and a disk location can be taken by counting with the counter which the method of memorizing the

location of this rotation synchronizing signal b made the pulse position of the initial rotation synchronizing signal of arbitration the radix point (for example, radix point P1), and made the one-revolution pulse number the upper limit. Recording the location of this rotation synchronizing signal b is memorizing the counted value of the rotation synchronizing signal b to the location of the point P2 with storage, such as RAM (random access memory) as memory. The wave of an about 1 rotation period is shown in drawing 6 .

[0032] Therefore, there are the two periodic minimum values in the periodic data shown in drawing 6 (c). The point P3 which are the counted value of the point P2 this [whose] is the periodic minimum value, and the following periodic minimum value is the counted value to which 1 / 2 rotation pulse number got used. When this following counted value is calculated by the operation and this calculated counted value and the counted value under measurement become the same, the generation output of the tracking-on timing signal shown in drawing 6 (d) is carried out at the tracking control section 8. Like the gestalt 1 of the above-mentioned operation, tracking-on will be carried out and the actuation after outputting said tracking-on timing signal will close the loop formation of a tracking control system.

[0033] Thus, since it constituted, even if based on the number of counts from the radix point P1 of the rotation synchronizing signal b, tracking control can always be turned on with the mid gear of the eccentricity of a disk in stability, and the same effectiveness as the gestalt 1 of the above-mentioned operation that stable tracking control can be performed in the condition with little movable range of an actuator can be acquired. furthermore, since each counted value corresponding to the periodic minimum value which has 2 times in one revolution as shown in drawing 6 (c) is memorized, in not removing equipped with the same disk The tracking-on control after a two-times eye is based on one of counted value [finishing / the aforementioned storage / even if it does not detect the period of the tracking error signal a]. A generation output can be performed and stable tracking control can do the tracking-on timing signal shown in drawing 6 (d). It can prevent detecting correlation with the measurement location of the maximum of the period of the above-mentioned tracking error signal a, and the minimum value, and the generating location of the rotation synchronizing signal b, and carrying out duplication activation of the processing of memorizing in memory.

[0034] Moreover, the optical disk record regenerative apparatus of the gestalt 2 of this operation has the outstanding effectiveness that tracking-on can be correctly carried out also under the conditions which receive outpatient department vibration etc. If this equipment is put on the bottom of a frequency condition, the tracking actuator 4 will also vibrate and the tracking error signal a will specifically change. Although TORAKINGUON [elements other than the eccentric component by disk rotation (vibration) will join this tracking error signal a and / the mistaken place] Under the conditions of extent which is not influenced by vibration, when the first tracking-on control is executed, even if this equipment is put on the bottom of a frequency condition at the time of the tracking-on control after the two-times eye of the same disk, tracking-on can be carried out correctly, without being influenced of vibration.

[0035]

[Effect of the Invention] According to the optical disk record regenerative apparatus of this invention, as mentioned above by having established the center or the control means controlled to position to a mid gear mostly and to carry out tracking-on of the eccentric range according the mid gear of the movable range of a tracking actuator to disk rotation Tracking control can always be turned on with the mid gear of the eccentricity of a disk in stability, stable tracking control can be performed in the condition with little movable range of an actuator, and the precision and stability of tracking control in an eccentric disk can be raised.

[0036] Moreover, the period of the tracking error signal which produces said control means with the eccentric error by disk rotation is measured, and the change timing near the minimum value of this measured period is detected, and even if it is the case where it constitutes so that it may control to close the loop formation of a tracking control system to said detection timing, it has the same effectiveness as the above-mentioned. Moreover, the truck cross generation circuit which generates the crossing signal of a truck to the truck error signal which has the periodicity which synchronized said control means with

rotation of the motor made to rotate an optical disk, A measurement means to measure the period of the crossing signal of said truck, and a detection means to detect near the minimum value of said period, By constituting from a tracking timing generation circuit it is directed to a tracking control section that carries out tracking-on to the timing near the minimum value of said period, the control means to which it carries out possible [of the stable tracking control] is concretely realizable.

[0037] Moreover, a generation means to generate the rotation synchronizing signal which synchronized with rotation of the motor made to rotate an optical disk is established. The period of the tracking error signal which produces said control means with the eccentric error by disk rotation is measured. Detect correlation with the measurement location of the maximum of said period, and the minimum value, and the generating location of said rotation synchronizing signal, and it memorizes in memory. In the case where it constitutes so that the loop formation of a tracking control system may be closed to the timing near the minimum value of said period based on the number of counts from the metrics point of said rotation synchronizing signal Even if based on the number of counts from the metrics point of said rotation synchronizing signal, tracking control can be turned on with the mid gear of the eccentricity of a disk. The movable range of an actuator in few condition In not removing stable tracking control completed and especially equipped with the same disk The tracking-on control after a two-times eye is based on counted value [finishing / storage]. A generation output can be performed and stable tracking control can do a tracking-on timing signal. It can prevent detecting correlation with the measurement location of the maximum of the period of the above-mentioned tracking error signal, and the minimum value, and the generating location of said rotation synchronizing signal, and carrying out duplication activation of the processing of memorizing in memory.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram showing the configuration of the optical disk record regenerative apparatus of the gestalt 1 of operation of this invention
[Drawing 2] The block diagram showing the configuration of the eccentric minimum detecting element of the gestalt 1 of this operation
[Drawing 3] Drawing showing the signal wave form and data of a gestalt 1 of an important section [of this operation] [of tracking control]
[Drawing 4] The flow chart Fig. showing processing actuation of the eccentric minimum detecting element of the gestalt 1 of this operation
[Drawing 5] The block diagram showing the configuration of the optical disk record regenerative apparatus of the gestalt 2 of operation of this invention
[Drawing 6] Drawing showing the signal wave form and data of a gestalt 2 of an important section [of this operation] [of tracking control]
[Drawing 7] The block diagram showing the configuration of the conventional optical disk record regenerative apparatus
[Drawing 8] Drawing showing the optical spot locus of the disk by the rotation eccentricity of an optical disk
[Drawing 9] Drawing showing a motion of the actuator when carrying out tracking-on in a good location

[Drawing 10] Drawing showing a motion of the actuator when carrying out tracking-on in an unstable location
[Description of Notations]
9 The Eccentric Minimum Detecting Element
10 Truck Cross Generation Circuit
11 Truck Cross Period Measurement Circuit
12 It is Judgment Circuit Beyond Measurement Period Set Point.
13 Measurement Period Maximum Judging Circuit
14 The Measurement Period Direction Detector
15 Measurement Period Minimum Value Judging Circuit
16 Measurement Time Management Circuit
17 Tracking Timing Generation Circuit
18 Generation Means
18a FG sensor
18b Spindle rotation synchronizing signal generation section

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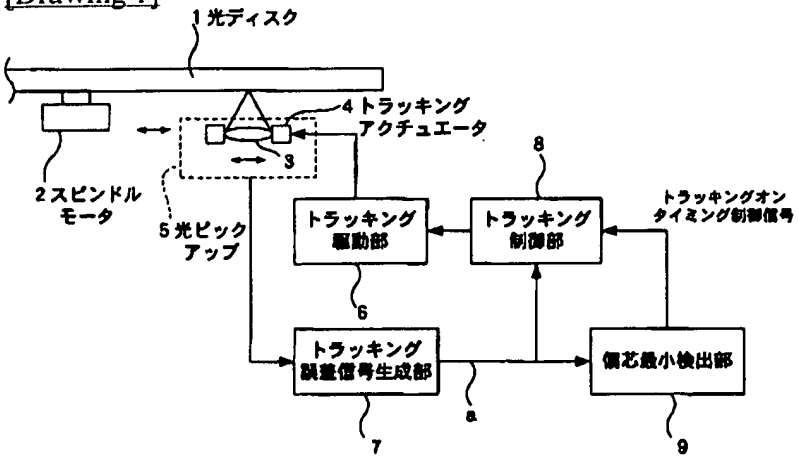
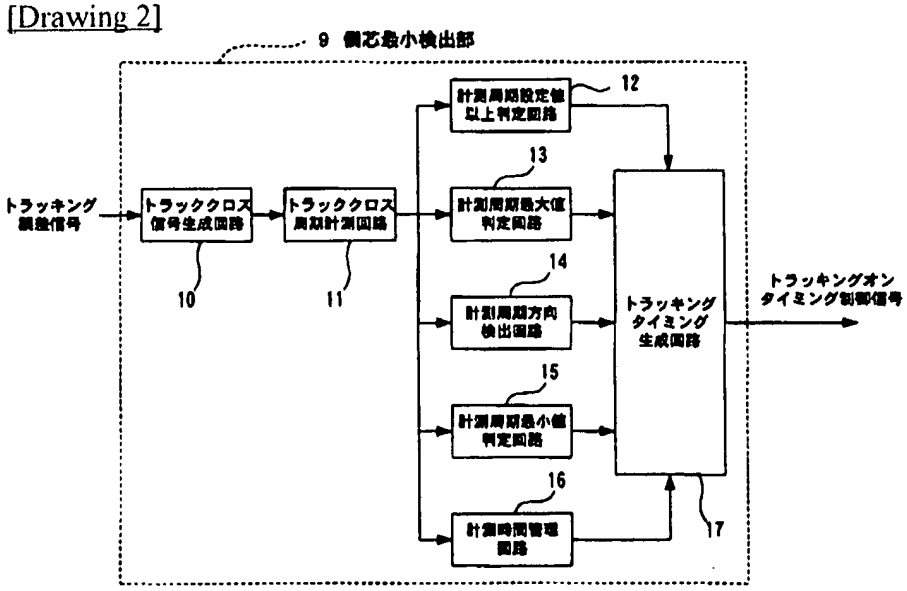
DRAWINGS

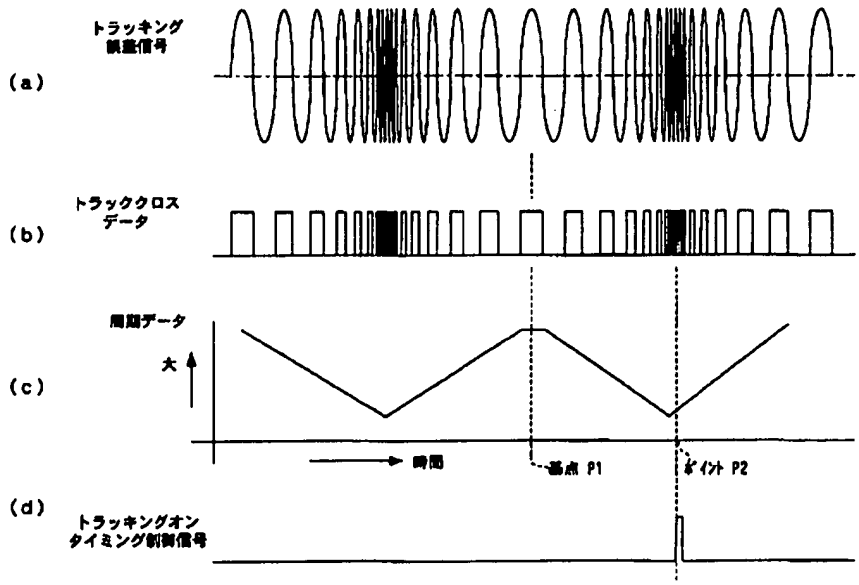
[Drawing 1]



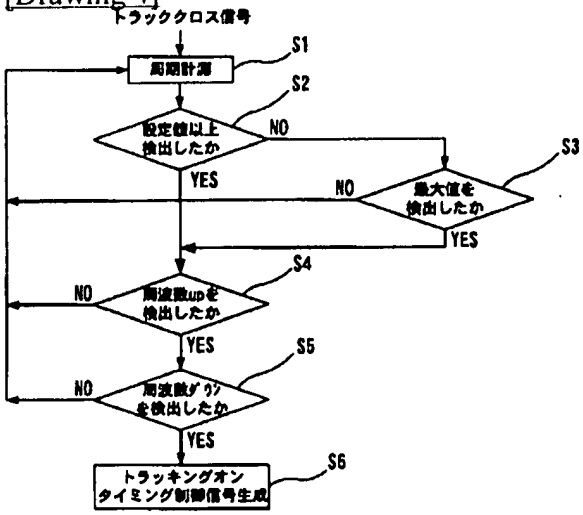
[Drawing 2]



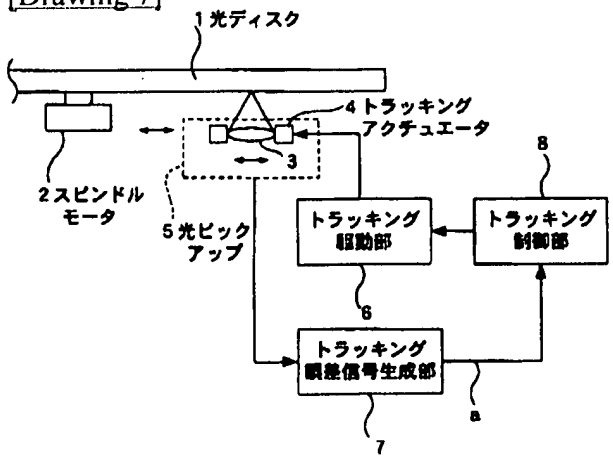
[Drawing 3]



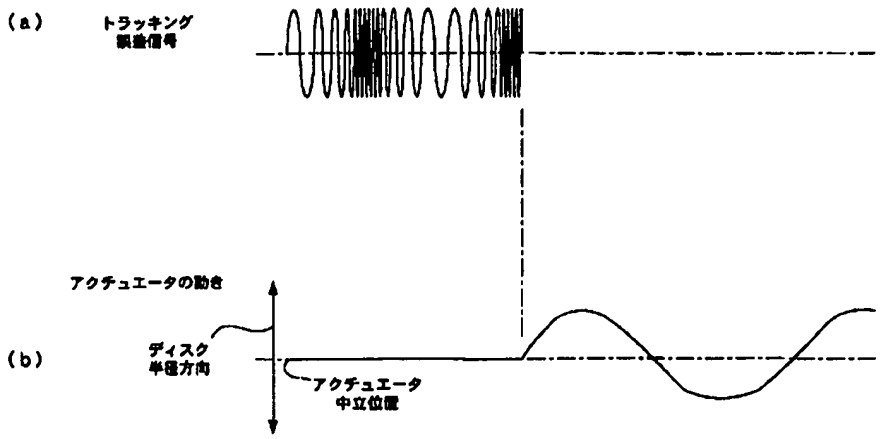
[Drawing 4]



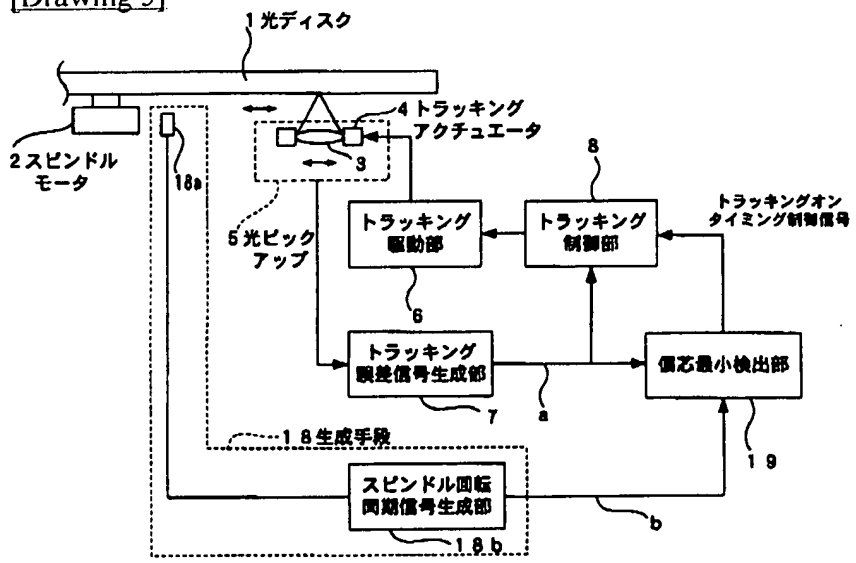
[Drawing 7]



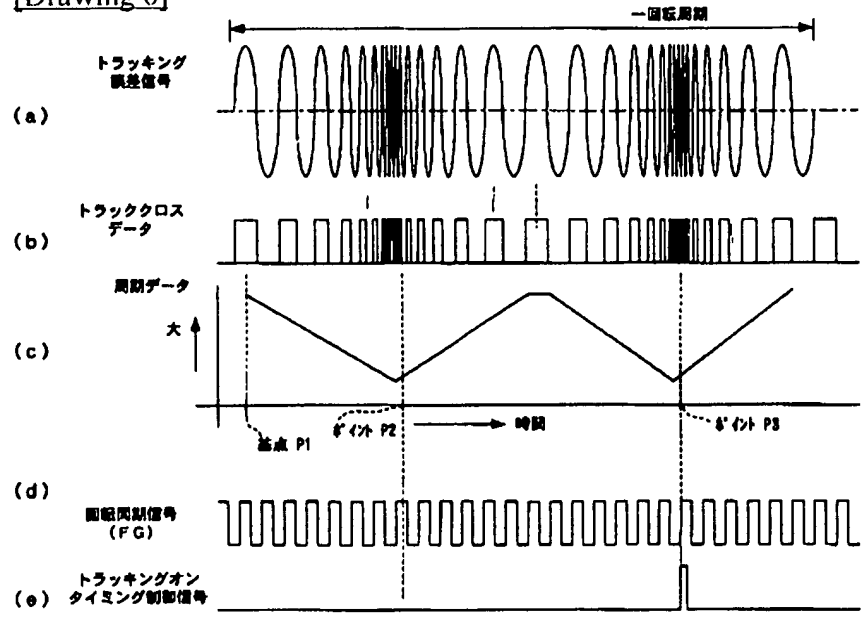
[Drawing 9]



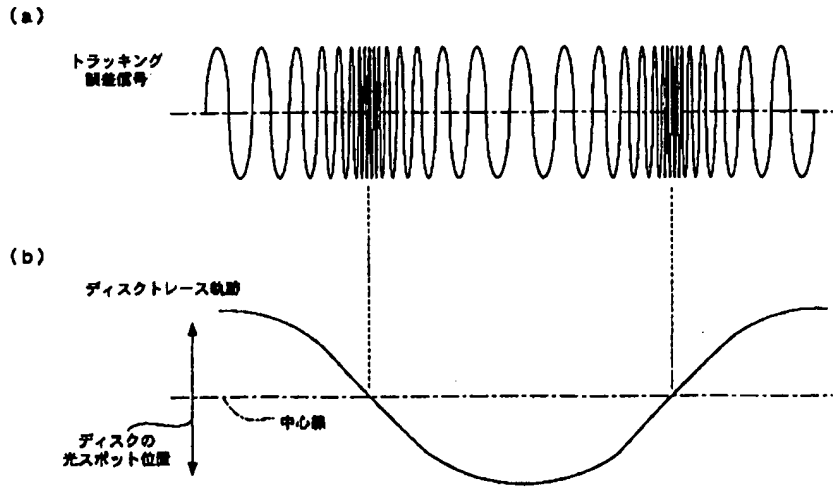
[Drawing 5]



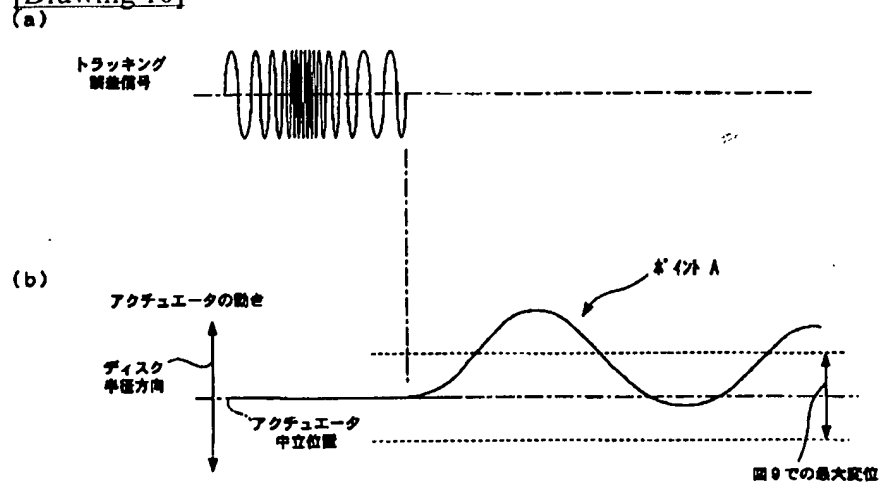
[Drawing 6]



[Drawing 8]



[Drawing 10]



[Translation done.]